

REMARKS

In response to applicant having elected claims 1-9 with traverse, the Office examined claims 1-9 and rejected same. Claims 1-21 remain pending.

Response to Restriction Requirement Having Been Maintained

Despite applicant's traversal, the Office maintains the restriction requirement, asserting that:

... claims 1-9 requires the office to find structural features and claims 10-21 requires the office to find the process of making the structure. This requires office to search in different Class, which is a burden.

Applicant respectfully requests that the Examiner reconsider.

Firstly, the restriction requirement as originally provided did not assert that the classes that would be searched would be different, and the Office action being responded to by this paper does not indicate what those different classes would be. Secondly, by the above-noted logic used to maintain the restriction, it seems that a restriction requirement would be made in any patent application with claims to both a device and a process for making the device, but at 806.05(f) the MPEP provides:

A process of making and a product made by the process can be shown to be distinct inventions if either or both of the following can be shown: (A) that the process as claimed is not an obvious process of making the product and the process as claimed can be used to make another materially different product; or (B) that the product as claimed can be made by another materially different process. [Emphasis added.]

...

If applicant convincingly traverses the requirement, the burden shifts to the examiner to document a viable alternative process or product, or withdraw the requirement.

Thus, a restriction is not warranted just because an application includes claims to both a product and a process for making the product. In the present application, the product as claimed in

claim 1 is a structure that includes three layers, one being a mixed oxide layer, with the mixed oxide layer including praseodymium arranged between the other two layers. The process as claimed in claim 10 is a process including steps of providing the same three layers, with the mixed oxide layer again arranged between the other two layers. The Office asserts that claims 1 and 10 would have to be searched in different classes, but it is exceedingly hard to see how this is so. Further, as applicant has traversed in keen detail the restriction requirement, it now falls to the Office to either document a viable alternative process that is materially different from the claimed process, or withdraw the restriction requirement.

The argument made below in respect to claim 1 also applies to claim 10, since claim 10 has limitations corresponding to each limitation in claim 1.

Rejection under 35 USC section 112, second paragraph

Claim 4 is rejected under 35 USC section 112, second paragraph. With this paper, claim 4 is changed in a way believed to obviate the grounds for rejection. Support for the change is at page 8, line 20, where the application explains:

The mixed oxide layer is a $(\text{Pr}_2\text{O}_3)_x(\text{SiO}_2)_{1-x}$ layer wherein the coefficient x at the interface 36 is of a value 0.3 and at an interface 38 to an adjacent praseodymium oxide layer (Pr₂O₃) 40 it is of a value 1.

Rejection under 35 USC section 103

Claim 1 recites a mixed oxide layer containing silicon, praseodymium and oxygen, which is of a layer thickness of less than 5 nanometers, arranged between a silicon-bearing layer and a praseodymium oxide layer. The Office asserts that Yu discloses such a mixed oxide layer, referring to template layer 305 of Yu. The template layer 305 is described only at paragraph [0039], which reads:

[0039] In one embodiment, a template layer 305 is formed

overlying substrate 301 in channel region 304. Template layer 305 may include 1-10 monolayers of silicon, oxygen, and an element suitable to successfully grow layer 306. For example, if layer 306 is formed of $\text{SrTiO}_3\text{-xN}_x$, where $x < 1.5$, a suitable template layer 305 may comprise Si--O--Sr or Si--O--N--Sr.

Yu does not disclose that the template layer 305 includes praseodymium. The disclosure by Yu that the template layer includes "an element suitable to successfully grow layer 306" is not a disclosure that the template layer 305 includes praseodymium, since it is not necessary that the template layer 305 include praseodymium in order to grow layer 306 even if layer 306 includes praseodymium. The prior art teaches growing a praseodymium oxide layer on a (pure) silicon oxide layer, as explained in the application at page 1, line 14:

Pr_2O_3 layers on Si(001) substrates, because of their comparatively high dielectric constant ($k \approx 30$), are particularly suitable for replacing the traditional gate-dielectric material SiO_2 in sub-0.1 μm CMOS technology. It is however generally assumed that an ultra-thin SiO_2 layer is necessary between the Si substrate and an alternative dielectric material in order to match bondings and charges to each other and to reduce mechanical stresses and in that way to achieve a high level of charge carrier mobility.

The application then explains that the ultra-thin SiO_2 layer reduces the dielectric effectiveness of the substitute material, i.e. the praseodymium oxide layer. The inventors, though, have determined that it is possible to replace the ultra-thin SiO_2 layer with the recited mixed oxide layer that includes praseodymium, which improves the dielectric effectiveness of the substitute material (compared to using just a thin SiO_2 layer). So Yu cannot be said to disclose that the template layer 305 includes praseodymium since it is not necessarily true that the template layer 305 includes praseodymium in order to grow layer 306, even if layer 306 includes praseodymium.

Further, the Office asserts that layer 306 of Yu is a praseodymium oxide layer. But para. [0040] provides:

As with layer 103 (FIG. 1), layer 306 is formed by substitutionally incorporating nitrogen into a monocrystalline oxide, such as an alkaline earth metal titanate, during formation of the insulating layer.
[Emphasis added.]

Thus, layer 306 is a praseodymium "oxide-nitride" layer containing substitutional nitrogen on oxygen sites. This material is different from praseodymium oxide. (Although par. [0025] provides for layer 103 that the fractional content x of nitrogen is defined as " $x < 1$ " and thus the Examiner might assert that this includes the case $x = 0$, having $x = 0$ is inconsistent with the statement in para. [0040] that the insulating layer is an "oxide nitride" with substitutional nitrogen.)

Thus, Yu does not disclose either the recited mixed oxide layer containing praseodymium or the recited praseodymium oxide layer.

Accordingly, applicant respectfully requests that the rejections under 35 USC §103 be reconsidered and withdrawn.

Conclusion

It is believed that all of the claims now pending in the application, namely claims 1-21, are in condition for allowance and their passage to issue is earnestly solicited.

Respectfully submitted,



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